

ABSTRACT OF THE DISCLOSURE

Disclosed herein are (1) a light-emitting semiconductor device that uses a gallium nitride compound semiconductor ($\text{Al}_x\text{Ga}_{1-x}\text{N}$) in which the n-layer of n-type gallium nitride compound semiconductor ($\text{Al}_x\text{Ga}_{1-x}\text{N}$) is of double-layer structure including an n-layer of low carrier concentration and an n^+ -layer of high carrier concentration, the former being adjacent to the i-layer of insulating gallium nitride compound semiconductor ($\text{Al}_x\text{Ga}_{1-x}\text{N}$); (2) a light-emitting semiconductor device of similar structure as above in which the i-layer is of double-layer structure including an i_L -layer of low impurity concentration containing p-type impurities in comparatively low concentration and an i_H -layer of high impurity concentration containing p-type impurities in comparatively high concentration, the former being adjacent to the n-layer; (3) a light-emitting semiconductor device having both of the above-mentioned features and (4) a method of producing a layer of an n-type gallium nitride compound semiconductor ($\text{Al}_x\text{Ga}_{1-x}\text{N}$) having a controlled conductivity from an organometallic compound by vapor phase epitaxy, by feeding a silicon-containing gas and other raw material gases together at a controlled mixing ratio.